# *sat-nms* VSAT Local Controller

# Installation Manual

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# Introduction

The VLC installation manual describes the steps of the basic configuration for a new VLC which shall be prepared for it's first use. These steps apply to VLCs which are going to be upgraded or re-used as well.

The chapter 'Before you start' gives some advice which information to collect before you start to configure a VLC.

The chapter 'VLC basic configuration' describes the steps to prepare a VLC coming 'out of the box' for it's on-site usage. This covers the VLC network setup including topics like the VLC - NMS communication management and IP addresses as well as a detailed guide how to extend a VLC with additional serial interfaces.

This manual coverts also the new version of the VLC which SatService delivers since March 2003 with serial numbers greater or equal 1020. Changes in the documentation for the new VLC's are marked with the NEW label.

NEW The Chapter 'setup program' describes the new setup program for the VLC configuration.

Chapter 'Configuring the VLC for the equipment setup' adds a short discription how to tell the VLC which type of equipment shall be controlled at which interface port without using the NMS.

Finally, the 'Appendix' provides some reference information, amongst other things a complete list of device drivers comping with the VLC.

# Before you start

To configure a VLC, there are some information about this VLC you need to collect. First of all you have to assign an ID to the VLC. Each VLC managed by the NMS has it's unique ID. VLC IDs are number s in the range 1 ... 1600. The NMS names the VLCs 'VLC0001' ... 'VLC1600' according to these numbers. There is no need to number the VLSs in a close sequence. However, IP routing might be simpler to configure if you limit the VLC IDs to 16 or 32 for a small network.

The next important question to check is how many serial interfaces does the VLC need to control the devices attached to it. You probably will have clarified this before you purchased the VLC. But if you are going to upgrade or reconfigure a VLC which was already in use, you have to figure out now which serial interface boards have to be built into the VLC. Chapter 'Adding serial interfaces' gives you an overview, which kinds of serial boards the VLC may be configured for.

As a last point, you have to decide in which way the VLC shall communicate with the NMS. Does the VLC use a dial-up link via modem or ISDN terminal adapter? Or does the VLC connect directly via Ethernet to the NMS? Are there special requirements regarding the IP routing to the VLC? Chapter 'Network configuration' demonstrates the some configuration variants.

# VLC basic configuration

To prepare a VLC before it is used the first time (or if it shall be re-configured), the following parameters must be set at the VLC:

NEW You can use the setup program for new VLC's to configure these settings.

**VLC number/ID:** Within the NMS, each VLC must have a unique ID assigned to it. The NMS software accesses the VLC through this identifier. The VLC ID is a number in the range 1 .. 1600. The factory default for the VLC ID is 1.

*Parameter:*
VLC_ID=[1..1600]
NEW SATNMS_HOSTNAME="vlc[0001..1600]"

NEW **Working mode** Set this option to 'vlc'.

*Parameter:*
SATNMS_TYPE=vlc

**Serial interface setup:** VLCs can be used with different serial interface boards built in. The VLC software directly supports a number of boards in several combinations. The serial interface setup parameter selects a combination of I/O boards from a given set. The factory default for this parameter selects 2 passive 4-port serial boards. Chapter 'Adding serial interfaces' gives a complete reference which combinations of serial interface boards are supported, how the boards must be prepared and which settings are to be made in the main configuration file. For other supported interface boards and the appropriate configuration parameters refer also to Chapter 'Adding serial interfaces'.

*Parameter:*
SERIAL=[0..14]
NEW SATNMS_SERIAL=[0..14]

**Modem parameters:** The VLC will connect to the NMS via a modem or ISDN terminal adapter in most cases. The factory defaults initialize a modem at the first serial port using 34800 bps. You may want to change the modem parameters for a ISDN terminal adapter or disable the modem completely if the VLC is connected to the NMS via Ethernet.

*Parameters:*
USES_MODEM=[yes|no]
NEW SATNMS_MODEM_USE=[yes|no]

**Ethernet parameters:** The parameters of the VLC's Ethernet port have to be set in order to integrate the VLC into the network it is part of. Chapter 'Network configuration examples' explains some common network setups for a VLC.

**UPS setup:** The VLC is prepared to connect to a battery power supply through a special cable connected to the second serial port. This cable uses the handshake lines to tell the VLC when to give a power fail alert and when to shut down because the battery is going low. UPS support is disabled by default.

*Parameters:*
USES_UPS=[yes|no]
NEW SATNMS_UPS_USE=[yes|no]

These basic configuration parameters are set by editing one configuration file at the VLC. This means, you have to login to the Linux operating system running at the VLC and changes the configuration file. Chapter 'How to connect to the VLC' explains, which options the VLC provides to do this task. Chapter The file '/etc/rc.vlc' provides a reference of all parameters which can be set in this configuration file.

NEW Chapter 'setup program' describes the use of the setup program for new VLC's and Chapter 'The file '/etc/satnms.rc'' provides a reference to all parameters.

# Network configuration

For the VLC network configuration, there are five common scenarios how to use the Ethernet port of the VLC. The paragraphs below describe necessary configuration settings for these frequently used configurations.

**1. The VLC does not use the Ethernet at all**

It is recommended **not** to switch off the Ethernet functionality at the VLC. Leave the network settings at their factory defaults, this enables the Ethernet interface and assigns the IP address `192.168.2.222` to it. You will be able to connect to the VLC for maintenance tasks at a later point, usually there is no reason to disable this facility.

*parameters:*
USES_ETHERNET=[yes|no]

NEW The new System does not provide an option to disable the ethernet interface. If you really want to do this you have to edit the configuration files of the operating system directly.

**2. The VLC connects via modem/ISDN-TA to NMS, Ethernet is used for occasional configuration or maintenance jobs**

You have to decide in this case if you will leave the default IP address for the VLC or if you have to integrate it in a LAN with a given address space. Depending on this you will have to configure the VLC's IP settings.

The IP address of the VLC's Ethernet interface is **not** the address the NMS uses to access the VLC. While s PPP session between NMS and VLC is running, the NMS accesses the VLC at an address computed from the VLC ID. The Ethernet IP address may be freely chosen, however the subnet routed to the Ethernet interface and the subnet routed to the NMS must not

overlap. The IP routing happening between VLC and NMS is described more detailed with the next scenario.

*Ethernet interface parameters:*
ETHER_ADDR
ETHER_SNET
ETHER_MASK
NEW SATNMS_IP_ADDRESS
NEW SATNMS_IP_NETMASK
*Modem parameters:*
USES_MODEM=[yes|no]
MODEM_INIT="[InitString]"
MODEM_BAUD=[Baudrate]
NEW SATNMS_MODEM_USE=[yes|no]
NEW SATNMS_MODEM_INIT="[InitString]"
NEW SATNMS_MODEM_BAUD=[BaudRate]

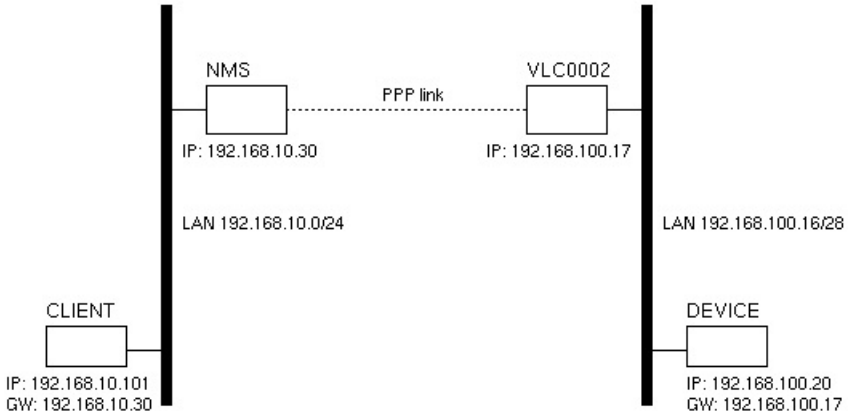
**3. The VLC connects via modem/ISDN-TA to NMS. To the VLC Ethernet some devices are connected you want to access from the NMS**

NMS and VLC are able to act as IP routers and to provide an on demand IP link between the LAN the NMS is connected to and the Ethernet trunk behind the VLC.

For this reason, the NMS uses a unique IP address space for each VLC during an online PPP session to it. VLCs are assigned to IP addresses in steps of 16, starting at `192.168.100.1`. VLC0001 is at `192.168.100.1`, VLC0002 at `192.168.100.17` and so on. Moreover, the NMS routes a subnet masked `255.255.255.224` to each VLC. The subnet `192.168.100.0/28` is routed to VLC0001, `192.168.100.16/28` is routed to VLC0002 and so on.

The VLC may be configured to use same address valid for the PPP interface for the Ethernet interface, too. With this configuration, the VLC routes addresses for the `255.255.255.224` subnet assigned to it to it's Ethernet interface.

To activate this configuration, assign empty strings to the 'ETHER_ADDR', 'ETHER_SNET' and 'ETHER_MASK' (NEW 'SATNMS_IP_ADDRESS', 'SATNMS_IP_NETMASK') parameters in the 'rc.vlc' file. Devices or hosts which shall be accessible from the NMS must configured to an IP address within the subnet the VLC is assigned to. The remote devices / hosts must have the VLC's IP address set as the gateway for the NMS' address space.




The diagram above shows an example for this configuration. The CLIENT computer at the NMS site can access the DEVICE at the VLC's site at it's address `192.168.100.20`. The gateway settings of the communication partners ensure, that the packets are routed through the NMS -- VLC link.

**4. The VLC connects via Ethernet to NMS. The modem line is not used**

This scenario described here is quite simple: The VLC gets one IP address assigned to, this address must be in the NMS LAN subnet. The VLC does not need a modem to be connected at ttyS0. You absolutely should set the 'USES_MODEM' (NEW 'SATNMS_MODEM_USE') parameter to 'no' in this case or else the VLC will permanently try to initialize a modem which is not present. The VLC might run into trouble due to such a misconfiguration.

Yet another advantage of this configuration is the fact, that the ttyS0 interface now becomes available for M&C function of the

VLC.

NEW If your NMS Server is not in the same Subnet as the VLC but you have a connection via a WAN you can also configure a default route of the VLC. Additionally you can configure the Adress of a DNS Name Server.
*parameters:*
NEW SATNMS_IP_GATEWAY
NEW SATNMS_IP_DNSSERVER

Statics route maybe configured in the file `/etc/network/interfaces` in the section of the ethernet interface eth0 directly (not in the satnms configuration file).

```
auto eth0
  iface eth0 inet static
  address 192.168.2.222
  netmask 255.255.255.0
  gateway 192.168.2.254
  up route add -net 192.168.1.0 netmask 255.255.255.0 gw 192.168.2.253
  down route del -net 192.168.1.0 netmask 255.255.255.0
```

The last two lines sets a static route to the 192.168.1.0 network if the interface goes up and removes this route if the interface goes down.

**5. The VLC connects via Ethernet to NMS. The modem line is used as backup**

The last scenario described here corresponds to the previous one, but the Modem or ISDN-TA is connected but only used in the case that the VLC is not reacheable via the Ethernet interface. Just configure the VLC for Ethernet and Modem use. Then configure the NMS with both Addresse (Ethernet-IP and PPP-IP) and the NMS Server tries first to connect via Ethernet and then via the Dialup link.

## How to connect to the VLC

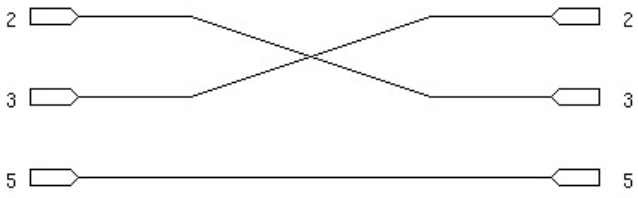
To access the VLC's Linux operating system, there are basically three methods:

**1. Connect a CRT monitor and a keyboard**

This is the preferred method, because you can not only access the running Linux operating system but also the BIOS configuration screen and some MS-DOS based configuration programs as well. It is recommended to use a CRT monitor rather than a LCD panel as some LCD panels have been reported to refuse syncing to the VLC's screen resolution.NEWWith the new VLC such problems with LCD panels are not known.

**2. Connect a terminal to the ttyS1 serial interface**

The VLC accepts a VT100 type terminal (or a PC running a terminal emulation program) at the serial interface 'ttyS1' (see the diagram at the end of this chapter). You need a special cable for this case, wired as shown in the diagram below.




The cable, with 9-pin sub-D socket connectors at both sides, connects the pins 2, 3 and 5 with pin 2 and 3 crossed. All other pins are not connected. This is important to avoid any interference with the battery power supply function which uses the other lines of this interface.

The terminal / PC must be set to 9600 baud, 8 data bits, no parity. Hardware flow control must be switched off. When typing ENTER at the terminal, you should get a login prompt.

**3. Connect the VLC to the LAN and use telnet to login**

The VLC accepts telnet logins at the network interface. If you know the actual setup configuration of the VLC's Ethernet interface (specially it's IP address), you may con figure a computer to see the VLC in it's address space and connect this computer via Ethernet to the VLC. Telnet is not prefered for the new VLC's.

The VLC by default is configured to the address `192.168.2.222`.

**NEW 4. Connect the VLC to the LAN and use SSH to login**

Use the Secure Shell (ssh) to connect to the VLC via LAN. The connection is encrypted and is much more secure as the plaintext protocol from Telnet.

The VLC by default is configured to the address `192.168.2.222`.

**Login procedure**

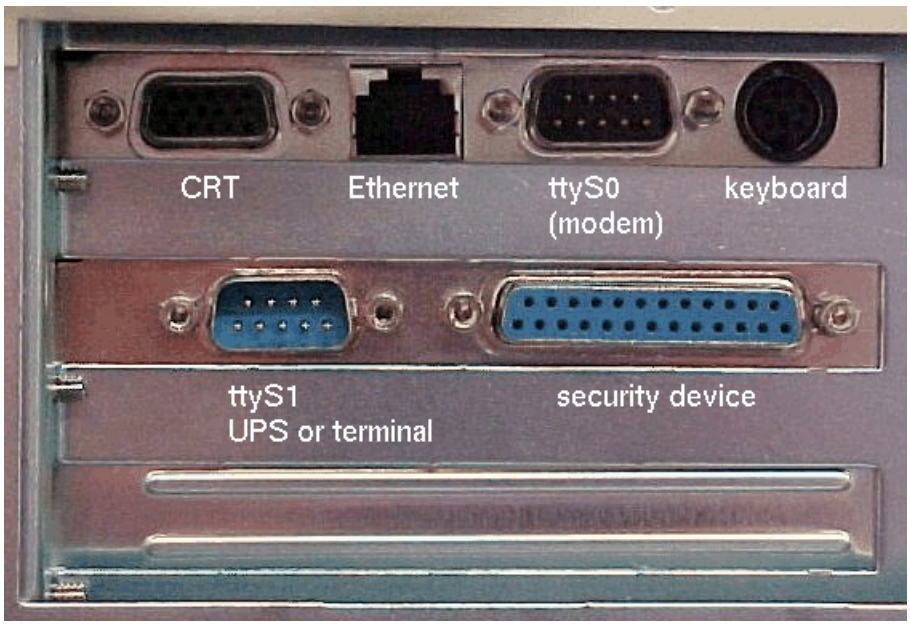
Regardless of physical method of connecting to the VLC you chose, you have to login at the Linux operating system before you can modify the VLC setup configuration. The common login procedure is two step:

First you have to login as user 'vlc' (password 'vlc'). When you are logged on as 'vlc', issue the command 'su' which gives you root / administrator privileges on this computer. When the VLC asks for the password, enter 'root'.

NEW The username and password of new VLC's differs from the old version. Use user 'satnms' and password 'satnms' to login. The root password remains the same ('root').

**VLC connectors**

The picture below, showing a part of the VLC's rear panel, denominates the connectors of the VLC core component for your orientation.




**NEW VLC Connectors and Serial Card positions**

Remember to connect the security device coming with the VLC to the 25 pin connector. The VLC will not work without this!

# The file '/etc/rc.vlc'

NEW See the following chapter for the description of the new configuration file /etc/satnms.rc

Below the file '`/etc/rc.vlc`' with the factory default settings is listed. Comments in the file describe the meaning and valid range of each setting at great length. To change some of the settings, connect to the VLC and login as described in the previous chapter and then open this file in the editor. Change the parameters at your needs and save the file. After rebooting the VLC (command 'reboot') the new settings become effective. Please note, that changing the IP address probably will lock you out after reboot if you connected via telnet to the VLC.

The parameter 'USES_SCC' is reserved for a future extension of the VLC. Satellite control communication between VLC and NMS actually is only available in networks planned and configured by SatService GmbH. Therefore, 'USES_SCC' should be kept 'no'.

```
#
#   VLC configuration file. After changing this file, the VLC should
#   be rebooted to execute the changes
#

###############################################################################
#
# VLC Identification
#
###############################################################################

# A unique identification number for the VLC in the network. Must
# be in the range 1 .. 1600 decimal.
#
VLC_ID=1


###############################################################################
#
# Network Settings (VLC-NMS Communication)
#
###############################################################################

# Set this to "yes" if the VLC shall setup it's Ethernet interface on
# startup. If the VLC shall access the NMS through this interface, you
# must assign the interface an address in the NMS' IP address space.
#
# If you leave ETHER_ADDR, ETHER_SNET and ETHER_MASK empty, the VLC
# will assign an address to the interface which is suitable for the
# remote control of LAN controlled devices through a PPP connection
# to the NMS. This address gets derived from the VLC_ID, a unique
# /28 subnet is assigned to each VLC
#
#
USES_ETHERNET=yes

    ETHER_ADDR=192.168.2.222
    ETHER_SNET=192.168.2.0
    ETHER_MASK=255.255.255.0
#    ETHER_ADDR=""
#    ETHER_SNET=""
#    ETHER_MASK=""

# Set this to "yes" if you have a SCC card installed and you want the
# VLC to talk with the NMS via satellite
#
USES_SCC=no

    SCC_ADDR=0.0.0.0
    SCC_SNET=0.0.0.0
    SCC_MASK=255.255.255.255

# Set this to "yes" if you have a modem/terminal-adapter connected
# to /dev/ttyS0 and you want to use a PSTN line for the VLC-NMS
# communication.
#
# MODEM_INIT    is sent by mgetty to the modem every minute
```

```
# MODEM_BAUD    the tty rate to be used to the modem
#
USES_MODEM=yes

    MODEM_INIT="AT\\&F OK"
    MODEM_BAUD=38400



#########################################################################
#
# Serial Interfaces (look at the manual how the cards have to be
# prepared to the I/O and interrupt settings the VLC expects)
#
#########################################################################

# Internal serial cards.
#
# Basically three types of cards are supported:
#  4-port     MOXA Smartio/Industrio 4 port card
#  8-port     MOXA Smartio/Industrio 8 port card
#  rocketport Comtrol Rocketport (8 port) card
# Select one of the following combinations:
#
#   0    no card installed
#   1    4-port card
#   2    4-port + 4-port card
#   3    8-port card
#   4    8-port + 4-port card
#   5    8-port + 4-port + 4-port card
#   6    8-port + 8-port card
#   7    8-port + 8-port + 4-port card
#   8    8-port + 8-port + 8-port card
#   9    rocketport card
#   10   rocketport + 4-port card
#   11   rocketport + 4-port + 4-port card
#   12   rocketport + rocketport card
#   13   rocketport + rocketport + 4-port card
#   14   rocketport + rocketport + rocketport card
#
SERIAL=2

# MOXA Intellio C320/Turbo cards 8 ... 96 ports
#
# Select the number of ports (multiples of 8) which are accessible
# through C320/Turbo boards. Say 0 if there is no C320 card in the
# VLC.
#
# Either one board (8, 16, 24 or 32 ports), two boards (40, 48,
# 56 or 64 ports) or three boards (72, 80, 88 or 96 ports) may be
# installed. One C320 board may be combined with one or two internal
# boards, Two C320 boards may be combined with one internal serial board.
#
INTELLIO=0

# Digi EtherLite TCP/IP terminal server
#
# If you say yes here, the Digi els driver is launched on system
# startup. You must have a running Ethernet interface for this,
# the file /etc/els.conf must be adapted to the unit's configuration
# you want to access
#
USES_ETHERLITE=no

#########################################################################
#
# Other Runtime Parameters
#
#########################################################################


# If the VLC is powered by a battery UPS which reports it's state to
# the /dev/ttyS1 port (see the manual regarding the special cable needed
```

```
# for this) say "yes" here. This starts a daemon which shuts down the
# VLC safely if the UPS reports "LOW BATTERY"
#
USES_UPS=no


# This must be yes.
#
START_VLC=yes
```

## The file '/etc/satnms.rc'

NEW Below the file '`/etc/satnms.rc`' with the factory default settings is listed. Comments in the file describe the meaning and valid range of each setting at great length. To change some of the settings, connect to the VLC and login as described in How to connect to the VLC and then start the setup program.

You can also open this file in an editor (e.g. vi or mcedit) and Change the parameters at your needs and save the file. To apply the settings to the Linux operation system call 'apply-setup' or set the parameter 'SATNMS_CONF_APPLY' to 'reboot' and reboot the system. This cause the system to apply all settings from /etc/satnms.rc before shutdown.

```
#
# sat-nms configuration file
#
# After changing this file run 'apply-setup' to execute the
# changes or set SATNMS_CONF_APPLY="reboot" and reboot the system
#
# For easy configuration use the 'setup' program
#

###############################################################################
#
# Basic settings
#
###############################################################################


# working mode
#
SATNMS_TYPE="vlc"


# vlc hostname
# A unique identification number for the VLC in the network. Must
# be in the range 1 .. 1600 decimal with a leading vlc
# e.g. "vlc0002"
#
SATNMS_HOSTNAME="vlc0002"


###############################################################################
#
# Network settings
#
###############################################################################


# ip-address and netmask
#
SATNMS_IP_ADDRESS="192.168.2.222"
SATNMS_IP_NETMASK="255.255.255.0"

# The default gateway, leave empty if not needed
#
SATNMS_IP_GATEWAY="192.168.2.254"

# Address of the dns name server, leave empty if not needed
#
SATNMS_IP_DNSSERVER="192.168.2.253"
```

```
#############################################################################
#
# Serial interface settings
#
#############################################################################


# Sets up the serial ports (passive cards and Comtrol Rocketport cards)
# in the computer. Replaces the original Debian setserial script.
#
# Basically three types of cards are supported:
#  4-port      MOXA Smartio/Industrio 4 port card
#  8-port      MOXA Smartio/Industrio 8 port card
#  rocketport  Comtrol Rocketport (8 port) card
#
# The variable SATNMis_SERIAL selects one of 15 combinations of cards. The
# software documentation shows the address/irq settings vor each board in
# each particular configuration
#
#     0:    no cards
#     1:    4-port
#     2:    4-port + 4-port
#     3:    8-port
#     4:    8-port + 4-port
#     5:    8-port + 4-port + 4-port
#     6:    8-port + 8-port
#     7:    8-port + 8-port + 4-port
#     8:    8-port + 8-port + 8-port
#     9:    ROCKET
#     10:   ROCKET + 4-port
#     11:   ROCKET + 4-port + 4-port
#     12:   ROCKET + ROCKET
#     13:   ROCKET + ROCKET + 4-port
#     14:   ROCKET + ROCKET + ROCKET
#
SATNMS_SERIAL=2

# MOXA Intellio C320/Turbo cards 8 ... 96 ports
# Select the number of ports (multiples of 8) which are accessible
# through C320/Turbo boards. Say 0 if there is no C320 card in the
# VLC.
#
# Either one board (8, 16, 24 or 32 ports), two boards (40, 48,
# 56 or 64 ports) or three boards (72, 80, 88 or 96 ports) may be
# installed. One C320 board may be combined with one or two internal
# boards, Two C320 boards may be combined with one internal serial board.
#
SATNMS_INTELLIO=0

# Digi EtherLite TCP/IP terminal server
#
# If you say yes here, the Digi els driver is launched on system
# startup. You must have a running Ethernet interface for this,
# the file /etc/els.conf must be adapted to the unit's configuration
# you want to access
#
SATNMS_ETHERLITE=no


#############################################################################
#
# Modem settings
#
#############################################################################


# Set this to "yes" if you have a modem/terminal-adapter connected
# to /dev/ttyS0 and you want to use a PSTN line for the VLC-NM
# communication. Default is "no"
#
SATNMS_MODEM_USE="no"

# Baud rate, the tty rate to be used to the modem
#
```

```
SATNMS_MODEM_BAUD="38400"

# Init string, is sent by mgetty to the modem every minute to
# initialize the modem
#
SATNMS_MODEM_INIT="AT&F"


########################################################################
#
# Setup program settings
#
########################################################################


# apply new configuration to system files manual or on reboot
#
SATNMS_CONF_APPLY="manual"
```

## Adding serial interfaces

A VLC can contain up to three serial IO cards which add RS232 or RS422/485 interfaces to the unit. While principally the VLC works with any serial IO card which is compatible to Linux, the units are pre-configured to work with a fixed set of card configurations. The following types of cards are supported by the VLC:

| | |
|---|---|
| Moxa Smartio/Industrio series | This is a family of 4-port / 8-port passive serial cards which are available with RS232 or RS422/485 interfaces and various types of connectors. |
| Comtrol Rocketport | The Rocketport is an active 8-port card providing 8 RJ45 connectors directly on the card's back. |
| Moxa Intellio C320 Turbo | The Intellio C320 is an active card which uses it's own processor to manage the data exchange to up to 32 ports for each card. The IO ports are located in rack-mountable modules containing 8 or 16 ports each. |
| Digi Etherlite Terminal Server | For large systems an external terminal server may provide a nearly arbitrary number of serial ports. The terminal server is connected to the VLC via Ethernet. |

The serial IO cards are not automatically recognized by the VLC. Each card must be configured to the address/irq settings expected by the software. Then the software must be told which cards are installed.

The card configuration is defined in the configuration file '/etc/rc.vlc'. The 'SERIAL' variable defines the Smartio/Industrio or Rocketport boards to be used. The 'INTELLIO' variable defines the number IO ports connected to one or more Intellio boards.

NEW The card configuration is defined in '/etc/satnms.rc' and the variable SATNMS_SERIAL defines the combination of interface cards. SATNMS_INTELLIO defines the number of IO ports connected to one or more Intellio boards.

### 4 / 8 Port Cards

The following table shows the configurations which can be selected with the parameter 'SERIAL'. The table uses the abbreviations **4-PORT**, **8-PORT** and **ROCKET** for Moxa Smartio/Industrio series and Rocketport cards respectively.

| SERIAL | Card 1 | Card 2 | Card 3 |
|---|---|---|---|
| 0 | - | - | - |
| 1 | 4-PORT | - | - |
| 2 | 4-PORT | 4-PORT | - |
| 3 | 8-PORT | - | - |
| 4 | 8-PORT | 4-PORT | - |
| 5 | 8-PORT | 4-PORT | 4-PORT |
| 6 | 8-PORT | 8-PORT | - |
| 7 | 8-PORT | 8-PORT | 4-PORT |

| | | | |
|---|---|---|---|
| 8 | 8-PORT | 8-PORT | 8-PORT |
| 9 | ROCKET | - | - |
| 10 | ROCKET | 4-PORT | - |
| 11 | ROCKET | 4-PORT | 4-PORT |
| 12 | ROCKET | ROCKET | - |
| 13 | ROCKET | ROCKET | 4-PORT |
| 14 | ROCKET | ROCKET | ROCKET |

The ports provided by these cards are named following a fixed scheme, making it easy to link port names to connector names.

## Moxa Intellio Cards

Ports at Moxa Intellio boards are defined by means of the 'INTELLIO' Variable. INTELLIO must be set to the total number of serial ports provided by the modules connected to Intellio boards. The VLC assumes, that the first 32 ports are assigned to board 1, the next 32 ports to to board 2 etc. 'INTELLIO=0' tells the VLC that there is no Intellio board in the system. Intellio boards may be combined with the 4/8 port boards discussed above, however, the total number of serial IO cards in the VLC must not exceed 3. Intellio cards are configured by jumpers/DIP switches.

The port names generated for Intellio cards follow a similar scheme as the passive cards do.

NEW The variable name was changed to SATNMS_INTELLIO.

## Digi Etherlite Terminal Server

The VLC also supports the Digi Etherlite terminal server series. Set the variable USES_ETHERLITE in the file /etc/rc.vlc to 'yes' if you have connected one or more terminals servers to the VLC's Ethernet port.

The terminal servers have to be set to fixed IP addresses within the subnet covered by the subnet of the VLC's Ethernet port. To tell the serial port driver which Etherlite units are connected, you must edit the file /etc/els.conf. For details, refer to the Digi user manual and the information available at the Digi web site concerning the Etherlite Linux driver.

NEW The variable name was changed to SATNMS_ETHERLITE in the configuration file '/etc/satnms.rc'.

## Port Naming

The VLC uses a fixed scheme to name it's serial ports. This scheme makes it easy to match port connections and the corresponding port names in the software:

| | |
|---|---|
| 4/8 port cards: | The port names are built as 'ttyS*ik*', where '*i*' is the number of the board (1..3) and '*k*' is the number of the port in the board (1..8). The latter port number matches that one printed on the boards bracket or on the individual connector.<br><br>Example: 'ttyS23' designates the third port on the second board. |
| Intellio cards: | The port names are built as 'tty*ikl*', where '*i*' is the number of the board (A..C), '*k*' is the number of the external IO module (1..4) and '*l*' is the individual port number at this module(1..8).<br><br>Please note, that 16 port modules are treated by the driver like 2 8-port modules in one housing. They occupy 2 module addresses where the first contains the ports 1..8, the second one the ports 8..16.<br><br>Example: 'ttyA18' designates the 8th port at the first module connected to the first Intellio board. |
| Etherlite ports: | The Etherlite serial port driver automatically assigns names to the ports it manages. The names are 'ttyN???' where the question marks are replaced by a number which identifies the individual port. Please refer to the Digi software documentation for the numbering scheme used. |

## VLC Serial IO Card Configuration 1

| | |
|---|---|
| No. of boards: | 1 |

| | |
|---|---|
| No. of ports: | 4 |
| Board 1: | Moxa Smartio/Industrio 4-port board at 0x180 / IRQ 10 |
| tty-names: | ttyS11, ttyS12, ttyS13, ttyS14 (board1) |

## VLC Serial IO Card Configuration 2

| | |
|---|---|
| No. of boards: | 2 |
| No. of ports: | 8 |
| Board 1: | Moxa Smartio/Industrio 4-port board at 0x180 / IRQ 10 |
| Board 2: | Moxa Smartio/Industrio 4-port board at 0x200 / IRQ 5 |
| tty-names: | ttyS11, ttyS12, ttyS13, ttyS14 (board1)<br>ttyS21, ttyS22, ttyS23, ttyS24 (board2) |

## VLC Serial IO Card Configuration 3

| | |
|---|---|
| No. of boards: | 1 |
| No. of ports: | 8 |
| Board 1: | Moxa Smartio/Industrio 8-port board at 0x180 / IRQ 10 |
| tty-names: | ttyS11, ttyS12, ttyS13, ttyS14, ttyS15, ttyS16, ttyS17, ttyS18 (board1) |

## VLC Serial IO Card Configuration 4

| | |
|---|---|
| No. of boards: | 2 |
| No. of ports: | 12 |
| Board 1: | Moxa Smartio/Industrio 8-port board at 0x180 / IRQ 10 |
| Board 2: | Moxa Smartio/Industrio 4-port board at 0x200 / IRQ 5 |
| tty-names: | ttyS11, ttyS12, ttyS13, ttyS14, ttyS15, ttyS16, ttyS17, ttyS18 (board1)<br>ttyS21, ttyS22, ttyS23, ttyS24 (board2) |

## VLC Serial IO Card Configuration 5

| | |
|---|---|
| No. of boards: | 3 |
| No. of ports: | 16 |
| Board 1: | Moxa Smartio/Industrio 8-port board at 0x180 / IRQ 10 |
| Board 2: | Moxa Smartio/Industrio 4-port board at 0x200 / IRQ 5 |
| Board 3: | Moxa Smartio/Industrio 4-port board at 0x380 / IRQ 11 |
| tty-names: | ttyS11, ttyS12, ttyS13, ttyS14, ttyS15, ttyS16, ttyS17, ttyS18 (board1)<br>ttyS21, ttyS22, ttyS23, ttyS24 (board2)<br>ttyS31, ttyS32, ttyS33, ttyS34 (board3) |

## VLC Serial IO Card Configuration 6

| | |
|---|---|
| No. of boards: | 2 |
| No. of ports: | 16 |
| Board 1: | Moxa Smartio/Industrio 8-port board at 0x180 / IRQ 10 |
| Board 2: | Moxa Smartio/Industrio 8-port board at 0x200 / IRQ 5 |
| tty-names: | ttyS11, ttyS12, ttyS13, ttyS14, ttyS15, ttyS16, ttyS17, ttyS18 (board1) |

| | |
|---|---|
| | ttyS21, ttyS22, ttyS23, ttyS24, ttyS25, ttyS26, ttyS27, ttyS28 (board2) |

## VLC Serial IO Card Configuration 7

| | |
|---|---|
| No. of boards: | 3 |
| No. of ports: | 20 |
| Board 1: | Moxa Smartio/Industrio 8-port board at 0x180 / IRQ 10 |
| Board 2: | Moxa Smartio/Industrio 8-port board at 0x200 / IRQ 5 |
| Board 3: | Moxa Smartio/Industrio 4-port board at 0x380 / IRQ 11 |
| tty-names: | ttyS11, ttyS12, ttyS13, ttyS14, ttyS15, ttyS16, ttyS17, ttyS18 (board1)<br>ttyS21, ttyS22, ttyS23, ttyS24, ttyS25, ttyS26, ttyS27, ttyS28 (board2)<br>ttyS31, ttyS32, ttyS33, ttyS34 (board3) |

## VLC Serial IO Card Configuration 8

| | |
|---|---|
| No. of boards: | 3 |
| No. of ports: | 24 |
| Board 1: | Moxa Smartio/Industrio 8-port board at 0x180 / IRQ 10 |
| Board 2: | Moxa Smartio/Industrio 8-port board at 0x200 / IRQ 5 |
| Board 3: | Moxa Smartio/Industrio 8-port board at 0x380 / IRQ 11 |
| tty-names: | ttyS11, ttyS12, ttyS13, ttyS14, ttyS15, ttyS16, ttyS17, ttyS18 (board1)<br>ttyS21, ttyS22, ttyS23, ttyS24, ttyS25, ttyS26, ttyS27, ttyS28 (board2)<br>ttyS31, ttyS32, ttyS33, ttyS34, ttyS35, ttyS36, ttyS37, ttyS38 (board3) |

## VLC Serial IO Card Configuration 9

| | |
|---|---|
| No. of boards: | 1 |
| No. of ports: | 8 |
| Board 1: | Comtrol Rocketport board at 0x180 |
| tty-names: | ttyS11, ttyS12, ttyS13, ttyS14, ttyS15, ttyS16, ttyS17, ttyS18 (board1) |

## VLC Serial IO Card Configuration 10

| | |
|---|---|
| No. of boards: | 2 |
| No. of ports: | 12 |
| Board 1: | Comtrol Rocketport board at 0x180 |
| Board 2: | Moxa Smartio/Industrio 4-port board at 0x200 / IRQ 5 |
| tty-names: | ttyS11, ttyS12, ttyS13, ttyS14, ttyS15, ttyS16, ttyS17, ttyS18 (board1)<br>ttyS21, ttyS22, ttyS23, ttyS24 (board2) |

## VLC Serial IO Card Configuration 11

| | |
|---|---|
| No. of boards: | 3 |
| No. of ports: | 16 |
| Board 1: | Comtrol Rocketport board at 0x180 |
| Board 2: | Moxa Smartio/Industrio 4-port board at 0x200 / IRQ 5 |
| Board 3: | Moxa Smartio/Industrio 4-port board at 0x380 / IRQ 11 |

| | |
|---|---|
| tty-names: | ttyS11, ttyS12, ttyS13, ttyS14, ttyS15, ttyS16, ttyS17, ttyS18 (board1)<br>ttyS21, ttyS22, ttyS23, ttyS24 (board2)<br>ttyS31, ttyS32, ttyS33, ttyS34 (board3) |

## VLC Serial IO Card Configuration 12

| | |
|---|---|
| No. of boards: | 2 |
| No. of ports: | 16 |
| Board 1: | Comtrol Rocketport board at 0x180 |
| Board 2: | Comtrol Rocketport board at 0x200 |
| tty-names: | ttyS11, ttyS12, ttyS13, ttyS14, ttyS15, ttyS16, ttyS17, ttyS18 (board1)<br>ttyS21, ttyS22, ttyS23, ttyS24, ttyS25, ttyS26, ttyS27, ttyS28 (board2) |

## VLC Serial IO Card Configuration 13

| | |
|---|---|
| No. of boards: | 3 |
| No. of ports: | 20 |
| Board 1: | Comtrol Rocketport board at 0x180 |
| Board 2: | Comtrol Rocketport board at 0x200 |
| Board 3: | Moxa Smartio/Industrio 4-port board at 0x380 / IRQ 11 |
| tty-names: | ttyS11, ttyS12, ttyS13, ttyS14, ttyS15, ttyS16, ttyS17, ttyS18 (board1)<br>ttyS21, ttyS22, ttyS23, ttyS24, ttyS25, ttyS26, ttyS27, ttyS28 (board2)<br>ttyS31, ttyS32, ttyS33, ttyS34 (board3) |

## VLC Serial IO Card Configuration 14

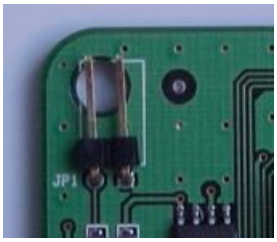
| | |
|---|---|
| No. of boards: | 3 |
| No. of ports: | 24 |
| Board 1: | Comtrol Rocketport board at 0x180 |
| Board 2: | Comtrol Rocketport board at 0x200 |
| Board 3: | Comtrol Rocketport board at 0x380 |
| tty-names: | ttyS11, ttyS12, ttyS13, ttyS14, ttyS15, ttyS16, ttyS17, ttyS18 (board1)<br>ttyS21, ttyS22, ttyS23, ttyS24, ttyS25, ttyS26, ttyS27, ttyS28 (board2)<br>ttyS31, ttyS32, ttyS33, ttyS34, ttyS35, ttyS36, ttyS37, ttyS38 (board3) |

## Serial IO Hardware Setting (4-PORT / 1)

The first Moxa Smartio/Industrio 4-port board in a VLC is operated at at 0x180 / IRQ 10, which is the factory default setting for these boards. So, usually the board can be used out of the box.

If you want to install a board which already has been configured to work as second or third board in a VLC, you have to reset the IO/IRQ settings of this board. The following steps describe how to install the card into a running VLC.

1. Shut down the VLC, switch it off.
2. Open the housing.
3. Install the board in a free slot.
4. Install the jumper at the rounded corner of the board (it's the only jumper on this board).

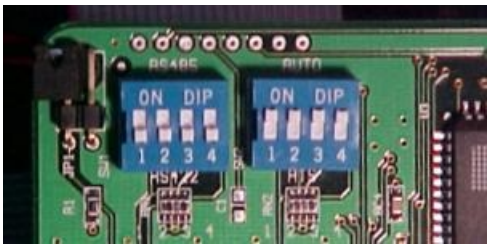


5. Connect a VGA computer monitor and a keyboard to the VLC.
6. Switch on the unit.
7. Press 'F5' when the VLC asks to do so. The VLC only waits for 3 seconds at this point, so keep an eye on the messages on the screen.
8. At the DOS prompt, enter MOXA
9. The configuration program first asks to select the card type (choose 'Smartio'), then it asks for the board address. Enter 'A700'.
10. Set the port addresses and IRQs according to the table shown below:

| IO Port | 180 | 188 | 190 | 198 |
|---|---|---|---|---|
| IRQ | 10 | 10 | 10 | 10 |
| Speed | Normal | Normal | Normal | Normal |
| Int.Vec. | | | | |

11. Press F10 to save the changes.
12. Remove the jumper from the board.
13. Close the housing and reboot the VLC (CTRL+ALT+DEL)

The RS485 version of the 4-port card additionally has 4 jumpers to enable the line termination resistors and eight dip switches to select the behavior of the RS485/RS422 ports. The VLC software uses a RS422 4-wire cabling with most of the equipment. The switch positions to operate all ports in RS422 mode is shown below:



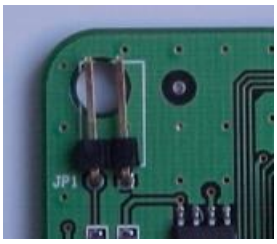

The jumpers for enabling the termination resistors are places beside the connector at the board's bracket. By closing the pins with a jumper, a termination resistor of 120 ohms gets placed across the receive lines of the port.

## Serial IO Hardware Setting (4-PORT / 2)

To install a Moxa Smartio/Industrio 4-port board in a VLC as the second serial board, the IO port and IRQ settings of the board must be changed to 0x200 / IRQ 5 by means of the DOS based configuration utility shipped with the board.

The following steps describe how to install the card into a running VLC.

1. Shut down the VLC, switch it off.
2. Open the housing.
3. Install the board in a free slot.
4. Install the jumper at the rounded corner of the board (it's the only jumper on this board).

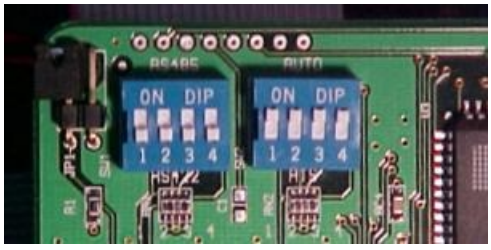



5. Connect a VGA computer monitor and a keyboard to the VLC.
6. Switch on the unit.
7. Press 'F5' when the VLC asks to do so. The VLC only waits for 3 seconds at this point, so keep an eye on the messages on the screen.
8. At the DOS prompt, enter MOXA
9. The configuration program first asks to select the card type (choose 'Smartio'), then it asks for the board address. Enter 'A700'.
10. Set the port addresses and IRQs according to the table shown below:

| IO Port | 200 | 208 | 210 | 218 |
|---|---|---|---|---|
| IRQ | 5 | 5 | 5 | 5 |
| Speed | Normal | Normal | Normal | Normal |
| Int.Vec. | | | | |

11. Press F10 to save the changes.
12. Remove the jumper from the board.
13. Close the housing and reboot the VLC (CTRL+ALT+DEL)

The RS485 version of the 4-port card additionally has 4 jumpers to enable the line termination resistors and eight dip switches to select the behavior of the RS485/RS422 ports. The VLC software uses a RS422 4-wire cabling with most of the equipment. The switch positions to operate all ports in RS422 mode is shown below:



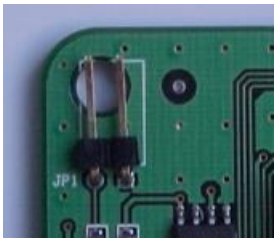

The jumpers for enabling the termination resistors are places beside the connector at the board's bracket. By closing the pins with a jumper, a termination resistor of 120 ohms gets placed across the receive lines of the port.

## Serial IO Hardware Setting (4-PORT / 3)

To install a Moxa Smartio/Industrio 4-port board in a VLC as the third serial board, the IO port and IRQ settings of the board must be changed to 0x380 / IRQ 11 by means of the DOS based configuration utility shipped with the board.

The following steps describe how to install the card into a running VLC.

1. Shut down the VLC, switch it off.
2. Open the housing.
3. Install the board in a free slot.
4. Install the jumper at the rounded corner of the board (it's the only jumper on this board).

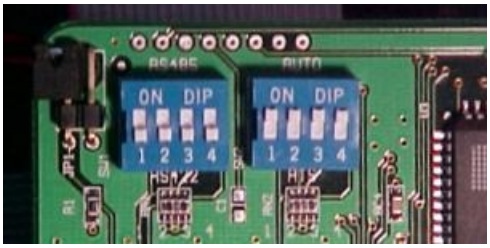



5. Connect a VGA computer monitor and a keyboard to the VLC.
6. Switch on the unit.
7. Press 'F5' when the VLC asks to do so. The VLC only waits for 3 seconds at this point, so keep an eye on the messages on the screen.
8. At the DOS prompt, enter MOXA
9. The configuration program first asks to select the card type (choose 'Smartio'), then it asks for the board address. Enter 'A700'.
10. Set the port addresses and IRQs according to the table shown below:

| IO Port | 380 | 388 | 390 | 398 |
|---|---|---|---|---|
| IRQ | 11 | 11 | 11 | 11 |
| Speed | Normal | Normal | Normal | Normal |
| Int.Vec. | | | | |

11. Press F10 to save the changes.
12. Remove the jumper from the board.
13. Close the housing and reboot the VLC (CTRL+ALT+DEL)

The RS485 version of the 4-port card additionally has 4 jumpers to enable the line termination resistors and eight dip switches to select the behavior of the RS485/RS422 ports. The VLC software uses a RS422 4-wire cabling with most of the equipment. The switch positions to operate all ports in RS422 mode is shown below:



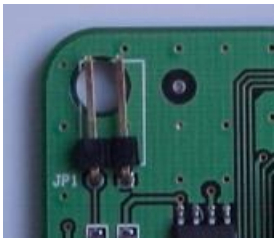

The jumpers for enabling the termination resistors are places beside the connector at the board's bracket. By closing the pins with a jumper, a termination resistor of 120 ohms gets placed across the receive lines of the port.

## Serial IO Hardware Setting (8-PORT / 1)

The first Moxa Smartio/Industrio 8-port board in a VLC is operated at at 0x180 / IRQ 10, which is the factory default setting for these boards. So, usually the board can be used out of the box.

If you want to install a board which already has been configured to work as second or third board in a VLC, you have to reset the IO/IRQ settings of this board. The following steps describe how to install the card into a running VLC.

1. Shut down the VLC, switch it off.
2. Open the housing.
3. Install the board in a free slot.
4. Install the jumper at the rounded corner of the board (it's the only jumper on this board).



5. Connect a VGA computer monitor and a keyboard to the VLC.
6. Switch on the unit.
7. Press 'F5' when the VLC asks to do so. The VLC only waits for 3 seconds at this point, so keep an eye on the messages on the screen.
8. At the DOS prompt, enter MOXA
9. The configuration program first asks to select the card type (choose 'Smartio'), then it asks for the board address. Enter 'A700'.
10. Set the port addresses and IRQs according to the table shown below:

| IO Port | 180 | 188 | 190 | 198 | 1A0 | 1A8 | 1B0 | 1B8 |
|---|---|---|---|---|---|---|---|---|
| IRQ | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| Speed | Normal | Normal | Normal | Normal | Normal | Normal | Normal | Normal |
| Int.Vec. | | | | | | | | |

11. Press F10 to save the changes.
12. Remove the jumper from the board.
13. Close the housing and reboot the VLC (CTRL+ALT+DEL)

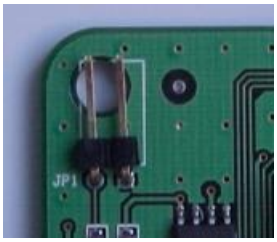
## Serial IO Hardware Setting (8-PORT / 2)

To install a Moxa Smartio/Industrio 8-port board in a VLC as the second serial board, the IO port and IRQ settings of the board must be changed to 0x200 / IRQ 5 by means of the DOS based configuration utility shipped with the board.

The following steps describe how to install the card into a running VLC.

1. Shut down the VLC, switch it off.
2. Open the housing.

3. Install the board in a free slot.
4. Install the jumper at the rounded corner of the board (it's the only jumper on this board).



5. Connect a VGA computer monitor and a keyboard to the VLC.
6. Switch on the unit.
7. Press 'F5' when the VLC asks to do so. The VLC only waits for 3 seconds at this point, so keep an eye on the messages on the screen.
8. At the DOS prompt, enter MOXA
9. The configuration program first asks to select the card type (choose 'Smartio'), then it asks for the board address. Enter 'A700'.
10. Set the port addresses and IRQs according to the table shown below:

| IO Port | 200 | 208 | 210 | 218 | 220 | 228 | 230 | 238 |
|---|---|---|---|---|---|---|---|---|
| IRQ | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Speed | Normal | Normal | Normal | Normal | Normal | Normal | Normal | Normal |
| Int.Vec. | | | | | | | | |

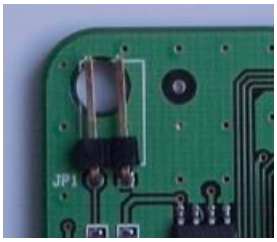
11. Press F10 to save the changes.
12. Remove the jumper from the board.
13. Close the housing and reboot the VLC (CTRL+ALT+DEL)

## Serial IO Hardware Setting (8-PORT / 3)

To install a Moxa Smartio/Industrio 8-port board in a VLC as the third serial board, the IO port and IRQ settings of the board must be changed to 0x380 / IRQ 11 by means of the DOS based configuration utility shipped with the board.

The following steps describe how to install the card into a running VLC.

1. Shut down the VLC, switch it off.
2. Open the housing.
3. Install the board in a free slot.
4. Install the jumper at the rounded corner of the board (it's the only jumper on this board).



5. Connect a VGA computer monitor and a keyboard to the VLC.
6. Switch on the unit.
7. Press 'F5' when the VLC asks to do so. The VLC only waits for 3 seconds at this point, so keep an eye on the messages on the screen.
8. At the DOS prompt, enter MOXA
9. The configuration program first asks to select the card type (choose 'Smartio'), then it asks for the board address. Enter 'A700'.
10. Set the port addresses and IRQs according to the table shown below:

| IO Port | 380 | 388 | 390 | 398 | 3A0 | 3A8 | 3B0 | 3B8 |
|---|---|---|---|---|---|---|---|---|
| IRQ | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 |
| Speed | Normal | Normal | Normal | Normal | Normal | Normal | Normal | Normal |
| Int.Vec. | | | | | | | | |

11. Press F10 to save the changes.
12. Remove the jumper from the board.
13. Close the housing and reboot the VLC (CTRL+ALT+DEL)

## Serial IO Hardware Setting (ROCKET / 1)

The first Comtrol Rocketport card in the VLC computer are operated at 0x180, which is the factory default. If you want to install a board which already has been configured to work as second or third board in a VLC, you have to reset the DIP switch settings as shown in the picture below:

## Serial IO Hardware Setting (ROCKET / 2)

To use a Comtrol Rocketport card as the second serial board, the DIP switches on the board must be set to the configuration shown below:

Please note, that the use of a Rocketport card as the second board only is permissible if the first board in the VLC also is a Comtrol Rocketport.

## Serial IO Hardware Setting (ROCKET / 3)

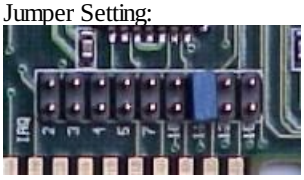
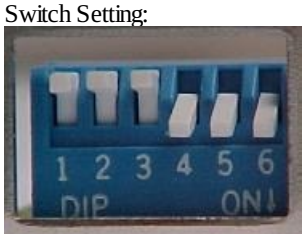
To use a Comtrol Rocketport card as the third serial board, the DIP switches on the board must be set to the configuration shown below:

Please note, that the use of a Rocketport card as the third board only is permissible if both, the first and the second board also are Comtrol Rocketport cards.

## Serial IO Hardware Setting (INTELLIO)

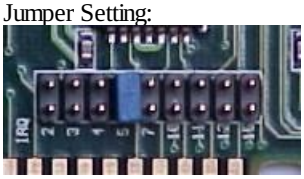
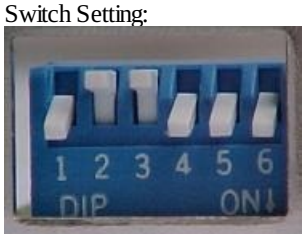
Moxa Intellio boards are configured by setting a jumper on the board to select the IRQ and a DIP switch located at the card's bracket. The table below shows the settings for this card.

**Card 1 at 0xdc000, IRQ 11:**

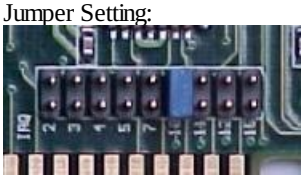
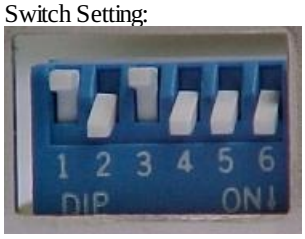
| Jumper Setting: | Switch Setting: |
|---|---|
|  |  |



**Card 2 at 0xd8000, IRQ 5:**

| Jumper Setting: | Switch Setting: |
|---|---|
|  |  |

**Card 3 at 0xd4000, IRQ 10:**

| Jumper Setting: | Switch Setting: |
|---|---|
|  |  |

## The setup program

NEW The setup program is a tool to configure the VLC. You have to login as root (see How to connect to the VLC) and then start the program by enter 'setup' ENTER at the command prompt. The dialog based program ask for the parameters, writes them to the ***sat-nms*** configuration file and finally applies the setting to the system and the appropriate configuration files of the Linux operating system.

See The file '/etc/satnms.rc' for a complete list and the complete description of all parameters.

# Configuring the VLC for the equipment setup

Telling the VLC which types of devices are connected to which serial interface you preferably will do at the NMS. The NMS software provides a graphical user interface which easily lets you add or remove interfaces or assign device drivers to interfaces. This chapter explains how to define the VLC equipment setup without the help of the NMS. You need to do this, if you intend to use the VLC without a NMS.

To edit the equipment setup definition, first connect to the VLC as described in chapter 'How to connect to the VLC'. You need not login as root, it is sufficient to be logged on as 'vlc' for this job. Then open the file 'vlc.setup' in /home/vlc (NEW /home/satnms ) in the editor, enter the interface, protocol and device definitions as described below:

For each interface at the VLC that is used for equipment control, enter a line looking like

**PORT** *port-name* **PROTOCOL** *protocol-name*

Following the PORT keyword the name of the serial interface is added. Serial interfaces are named **ttyS?** with Linux, **?** is an arbitrary number. See chapter 'Port Naming' learn about the port numbering scheme used with the VLC.

The protocol name following the PROTOCOL keyword tells the VLC which communication protocol to use with this interface. The communication protocol depends on the device type to control. The 'Device driver / protocol reference list' at the end of this document lets you look up the protocol name to be used with a particular device.

Each PORT .. PROTOCOL line in the 'vlc.setup' file must be followed by a at least one line defining the name and device driver for a device connected to this interface port.

**DEVICE** *device-name* **IS** *driver-name*

The name of the device may be freely chosen, however, the following restrictions apply:

- The name may consist of letters, digits and the hyphen ('-').

- The name must be unique in this VLC.
- Names longer then 11 characters will be truncated in the the event log display of the NMS.
- Configurations setup by SatService GmbH use device names in capital letters, you may want to follow with internal standard.

Chapter 'Device setup configuration file format' at the end of this manual gives a complete description of the file format used for the 'vlc.setup' file.

# Operating the VLC

The VLC is built to run 24 hours a day without local user interaction. There is no local control of a VLC. Once installed, a VLC will run under control of the NMS.

**Power supply**

The VLC is a computer containing a hard disk. Like with any computer, it may be **damaging** for the VLC to switch off the power while the VLC is running! It is strongly recommended to use a battery backed up power supply for the VLC.

NEW The new version contains a CompactFlash Card instead of a hard disk, but it may be **damaging** for the VLC to switch off the power while the VLC is running as well !

**Shut down procedure**

To switch off the VLC, use the following procedure:

1. Remove the security device at the rear side of the VLC. This will cause the VLC software to shut down.
2. After a couple of seconds the VLc beeps two times.
3. Now it is safe to switch off the VLC.

# Appendix

- Device driver / protocol reference list
- Device setup configuration file format
- A short introduction to 'vi'

## Device driver / protocol reference list

The table below list the device types supported by the VLC together with the name of the communication protocol to be used with this device type. Some device drivers allow the usage of an alternate communication protocol. The detailed device driver descriptions coming with the NMS user manual give more information about this.

| *driver name* | *protocol name* | *remarks* |
|---|---|---|
| Agilent-Spectrum-Analyzer | Terminal-LF-LF | |
| Anacom-KuBand-Transceiver | Anacom-Packet | |
| Anacom-Protection-Switch | Anacom-Packet | |
| Andrew-APC100 | Andrew | |
| Barco-RE4220 | Scientific-Atlanta-RCDS | |
| Cisco-Router | Cisco-Terminal | |
| Clarent-SDM9400 | SNMP | |
| Codan-Transceiver | Codan-Terminal | |
| Comstream-ABR202 | Comstream-ASCII | |
| Comstream-CM601A-SCPC | Comstream-Packet | |

| | | |
|---|---|---|
| Comstream-CM701-MC | Comstream-Packet | |
| Comstream-CM701 | Comstream-Packet | |
| Comstream-CX101 | Comstream-Packet | |
| Comstream-CX801 | Comstream-Packet | |
| Comstream-DAC700-PRE | Comstream-ASCII | |
| Comstream-DAC700 | Comstream-Packet | |
| Comstream-Demodulator | Comstream-Packet | |
| Comstream-LoSpeed-Modem-SCPC | Comstream-Packet | |
| Comstream-Modem-Card-SCPC | Comstream-Packet | |
| Comstream-Modulator | Comstream-Packet | |
| Comtech-CDM600 | Comtech | |
| CPI-350W-TWTA | Miteq-MOD95 | |
| CPI-TWTA | CPI-STX | |
| CPI-VZU-TWTA | CPI-STX-CR | |
| EF-Data-SDM300 | EF-Data | |
| Experimental | EF-Data | |
| Generic | Terminal-CR-CRLF-E | |
| Miteq-DVM100 | Miteq-MOD95 | |
| Miteq-KBand-Upconverter | Miteq-MOD95 | |
| Monterey-140 | Terminal-CR-CR | |
| NAIS-FP-8Port-Switch | NAIS-FPx | |
| NAIS-FP-AD-Test | NAIS-FPx | |
| NAIS-FP-Alarm-Circuit | NAIS-FPx | |
| NAIS-FP-Inv-Alarm-Circuit | NAIS-FPx | |
| NAIS-FP-Latching-Relay | NAIS-FPx | |
| NAIS-FP-Protection-Switch | NAIS-FPx | |
| NAIS-FP-Pulse-Output | NAIS-FPx | |
| NAIS-FP-Relay | NAIS-FPx | |
| NAIS-FP-Simple-Input | NAIS-FPx | |
| NAIS-FP-Simple-Output | NAIS-FPx | |
| NAIS-FP-Watchdog-Output | NAIS-FPx | |
| NDSatCom-1Axis-ACU | NDSatCom-ACU | |
| NDSatCom-3Axis-ACU | NDSatCom-ACU | |
| NDSatCom-KBand-Upconverter | Miteq-MOD95 | |
| NDSatCom-KuBand-Upconverter | Miteq-MOD95 | |
| NDSatCom-KuHBand-Upconverter | Miteq-MOD95 | |
| NDSatCom-KuLBand-Upconverter | Miteq-MOD95 | |
| NDSatCom-SkyWAN | SNMP | |
| NDSatCom-Step-Track | Terminal-CRLF-CRLF | |
| NDSatCom-TWTA | Miteq-MOD95 | |
| Newtec-NTC2080 | Newtec | |

| | | |
|---|---|---|
| Novotronik-Matrix24 | Novotronik | |
| ORB-Step-Track | Terminal-CRLF-CRLF | |
| Radyne-DM240 | Radyne-Comstream | |
| Radyne-DVB3030 | Radyne-Comstream | |
| Radyne-RCS11 | Radyne-Comstream | |
| Radyne-SFC1450 | Radyne-SFC | |
| SatService-ACU-IDU | Terminal-CRLF-CRLF | |
| SatService-ACU-ODM | HTTP | |
| SatService-Beacon-Receiver | HTTP | |
| SatService-Power-Sensor | HTTP | |
| Scopus-IRD26XX | Scopus-Master-Slave | |
| Scopus-IRD28XX | Scopus-Master-Slave | |
| SSE-ASat | SSE-NPI | |
| SSE-KStar | Terminal-CR-CRLF-E | |
| Tadiran-Scopus-E1000 | Tadiran-Scopus | |
| Tandberg-Alteia | Tandberg-Alteia | |
| Tandberg-TT1260 | Tandberg-TT1200 | |
| Vertex-7134-Step-Track | Vertex-7134 | |
| Vertex-7200-Step-Track | Vertex-7200 | |
| Vertex-Digital-Tracking-Receiver | Vertex-7200 | |
| Wegener-UNITY44XX | Wegener-Terminal | |

## Device setup configuration file format

At startup the VLC software reads the file 'vlc.setup'. This file tells the software, which kind of device shall be controlled at which interface of the VLC. The file is free formatted (line breaks are treated like spaces). C/C++-style comments are recognized and removed before the file is interpreted.

Usually you will use the device setup editor coming with the NMS software to define which kind of equipment is connected to which communication port of the VLC. If you plan to use a single VLC without having a NMS available, you will need to edit the 'vlc.setup' file directly.

The file uses a very limited number of keywords to specify the VLC's device configuration. If you modify this file manually, be aware that the VLC will behave in an unpredictable way if you start it with an misconfigured 'vlc.setup' file. Please note also, the device setup editor will reformat the 'vlc.setup' file and remove all comments from it if you edit the file with this utility.

**Example file 'vlc.setup'**

```
//
// This is an example vlc.setup file for the online help.
//

COMMENT "Example, 01-Mar-01"

// The "null" port holds the logical devices, they are the
// Scheduler, a Link device and a Frequency-Split device.
//
PORT null
    PROTOCOL Logical
    DEVICE LINK IS Link
    DEVICE SPLIT IS Frequency-Split

// At the first RS232 port the Matsushita control device is connected. It
// drives the polarization switch and the video cam switch.
//
PORT ttyS0
    IDLE 500
    PROTOCOL NAIS-FPx
    DEVICE POL-SW IS NAIS-FP-Latching-Relay
    DEVICE CAM-SW IS NAIS-FP-Simple-Output
    DEVICE KSTAR-SW IS NAIS-FP-Simple-Output

// The second RS232 port leads to the video encoder.
//
PORT ttyS0
    PROTOCOL Tadiran-Scopus
    DEVICE E1000 IS Tadiran-Scopus-E1000

// At the first RS485 port the DVB modulator is connected.
//
PORT ttyS0
    PROTOCOL Radyne-Comstream
    DEVICE DVB3030 IS Radyne-DVB3030

// This is the SSE transceiver
//
PORT ttyS0
    PROTOCOL Terminal-CR-CRLF-E
    DEVICE KSTAR IS SSE-KStar
```

**Keyword Reference**

Below the keywords which may appear in a 'vlc.setup' file are shown in tabular form.

<table>
<tr><td>COMMENT</td><td>The COMMENT keyword defines an identification string which should describe the purpose and the revision of this configuration file. A message with the string defined with COMMENT is listed in the event log when the software starts. There should be exactly one COMMENT definition in each 'vlc.setup' configuration file. It usually appears at the very beginning of the file, however this is not a must.<br><br><table><tr><td>Syntax:</td><td>COMMENT " Arbitrary String "</td></tr><tr><td>Example:</td><td><code>COMMENT "BDRT4 Setup, 11.May 2001"</code></td></tr></table></td></tr>
<tr><td>PORT</td><td>The PORT keyword introduces an interface port, which all definitions following the PORT definition refer to.<br><br><table><tr><td>Syntax:</td><td>PORT Interface-Name<br><br>Interface-Name is the name one of the serial ports installed at the computer or the special name "null". The latter is used in conjunction with the "Logical" communication protocol for so called "logical devices" which exist in the software without a counterpart in the real world.</td></tr><tr><td>Example:</td><td><code>PORT ttyS11</code></td></tr></table><br>For each interface the software uses, there must be one PORT definition. PROTOCOL, DEVICE or IDLE definitions following the PORT definition automatically refer to it.</td></tr>
<tr><td>PROTOCOL</td><td>The PROTOCOL keyword defines a communication protocol to be used with the PORT definition it follows. There must be exactly one PROTOCOL definition for each PORT. A port's communication protocol must be defined prior to any DEVICE definitions.<br><br>The set of communication protocols which are available on a certain VLC/M&C computer may vary. Type '<code>ls</code></td></tr>
</table>

| | |
|---|---|
| | `protocols/'` at the shell prompt in the home directory of the software to get a list of protocols which are actually available.<br><br>Syntax: **PROTOCOL** *Protocol-Name*<br>Example: `PROTOCOL NAIS-FPx`<br><br>There must be exactly one PROTOCOL specification following each PORT definition. The special protocol 'Logical' **must** be used, if the PORT is named 'null'. |
| DEVICE | The DEVICE keyword attaches a device to the port defined above. Usually you will attach one device to a port. Some protocols allow multiple devices being controlled through a single interface. In such a case you can attach more than one device to a port.<br><br>Syntax: **DEVICE** *Device-Name* **IS** *Driver-Name*<br><br>*Device-Name* is a short and pregnant name you choose to uniquely identify the device in the VLC/M&C. Device names must not be used twice. Device names should not be longer than 11 characters as they are cut to this length in event log messages.<br>*Driver-Name* selects the device driver the software shall use for this device.<br>Example: `DEVICE CAM-SW IS NAIS-FP-Simple-Output` |
| IDLE | For each port the software maintains an own 'thread' which polls the device(s) in an endless loop. In order not to eat up all the computer's CPU time, the thread rests in every loop cycle for a certain time. The default for this idle time is 1000 msecs.<br><br>The IDLE parameter lets you set the idle time for each port individually. Increasing the time unburdens the CPU, but makes the software recognize state changes of the device with some delay. You may want to set the idle time for a power meter involved on a power control loop to 200 ms while a "door open" alarm circuit only needs to be polled every 10 seconds.<br><br>Syntax: **IDLE** *n*<br><br>*n* the idle time (msecs)<br>Example: `IDLE 500` |

## A short introduction to 'vi'

*vi* is the standard text editor used on Unix systems. The M&C system being based on the Linux operating system uses an enhanced version of *vi*, called *vim (vi improved)*. The paragraphs below give a short introduction how to use this text editor.

NEW The new version contains also the Midnight Commander with an integrated editor. type *mc* at the command prompt to start the file manager and type *mcedit filename*, where filename is the path to the file which you want to edit, to start the editor. While running MC you can browse through the directories of the system and manipulate files. Use the function keys F1 .. F10 or select the functions from the menu.

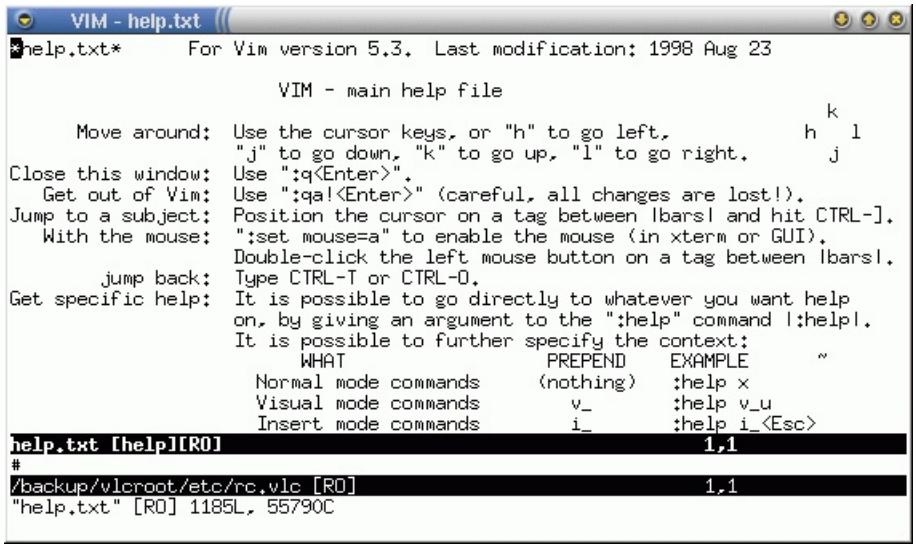
First of all, why to use *vi*? *vi* is known to be difficult to learn as it's concept is different as you might expect. There are other text editors available for Linux which are easier to handle. The answer is: *vi* turned out to be the only text editor program which works in a satisfying way when used in the Microsoft Windows telnet client. If you are going to maintain and configure a ***sat-nms*** network management system, you will find it comfortable even to do configuration jobs from your desk.

The most important difference between text editors like the 'notepad' known from the MS Windows operating system and *vi* is the modal behavior of *vi*. This means, *vi* treats keystrokes in a different way, depending on it's current mode. The two most important modes of *vi* are the COMMAND mode and the INSERT mode

In COMMAND mode, each keystroke tells the editor to do something. Even plain characters are commands rather than they are inserted into the text. The advantage of this COMMAND mode is that you can operate the editor without any special keys arrows or function keys.

In contrast, the INSERT mode lets you enter text but no commands. You have to switch between these modes while you are editing a text. Early versions of *vi* really didn't provide any commands while in INSERT mode. *vim* is much more flexible with this, e.g. you may move around the text using the cursor keys, even if you are in INSERT mode.

The *vi* editor contains a extensive online help manual which you can view from within the editor. Type the ESC key, followed by `:h` and ENTER. The editor splits the window and shows the online help in the upper part. Type `:q` to remove the help again.


VIM - help.txt
help.txt*  For Vim version 5.3.  Last modification: 1998 Aug 23
VIM - main help file
k
Move around: Use the cursor keys, or "h" to go left, h l
"j" to go down, "k" to go up, "l" to go right. j
Close this window: Use ":q<Enter>".
Get out of Vim: Use ":qa!<Enter>" (careful, all changes are lost!).
Jump to a subject: Position the cursor on a tag between |bars| and hit CTRL-].
With the mouse: ":set mouse=a" to enable the mouse (in xterm or GUI).
Double-click the left mouse button on a tag between |bars|.
jump back: Type CTRL-T or CTRL-O.
Get specific help: It is possible to go directly to whatever you want help
on, by giving an argument to the ":help" command |:help|.
It is possible to further specify the context:
WHAT PREPEND EXAMPLE
Normal mode commands (nothing) :help x
Visual mode commands v_ :help v_u
Insert mode commands i_ :help i_<Esc>
help.txt [help][RO] 1,1
#
/backup/vlcroot/etc/rc.vlc [RO] 1,1
"help.txt" [RO] 1185L, 55790C

The following chapter lists the most frequently used commands for the *vi* editor as a reference.

## Common commands

The table below lists some frequently used commands for the *vi* editor. Pleas note that all the commands except ESC must be typed in COMMAND mode. This means if the editor is in another mode than the COMMAND mode, you have to press the ESC key first.

Commands starting with a colon are so called 'ex commands' which are entered in the command / status line at the bottom of the terminal window. As soon as you press the colon character in COMMAND mode, the cursor jumps to the bottom line and lets you edit the command. Press ENTER to complete the command or ESC to return to COMMAND mode without changing anything.

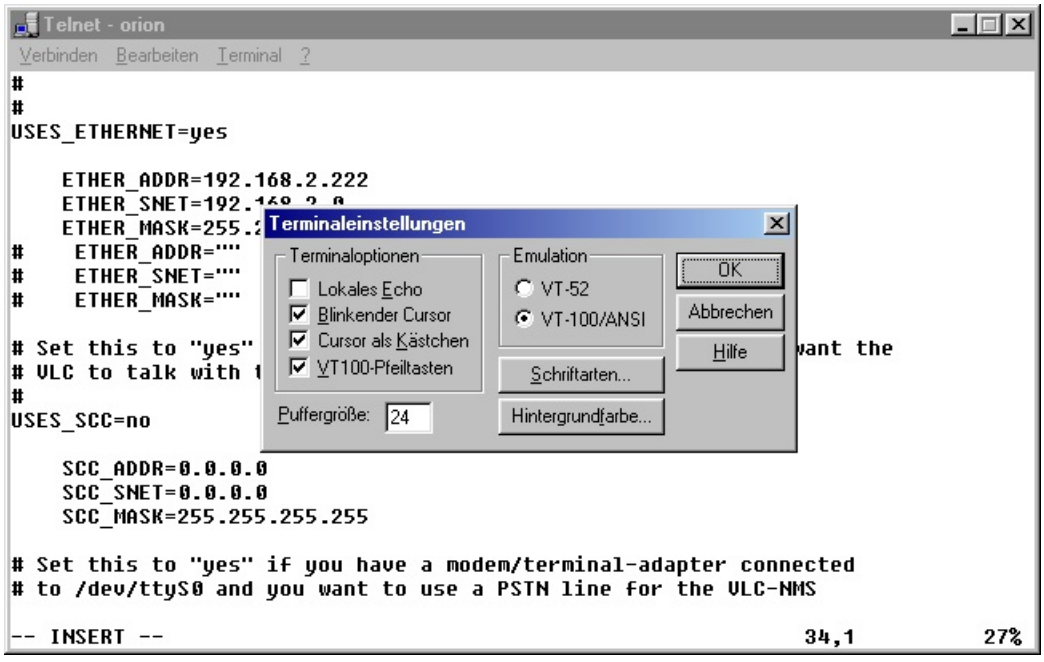
| | |
|---|---|
| | *Mode changes* |
| ESC | Leave the INSERT mode, revert to COMMAND mode. |
| **i** | Go to INSERT mode |
| | *Cursor movements* |
| **k** | Up |
| **j** | Down |
| **h** | Left |
| **l** | Right |
| **0** | Start of line |
| **$** | End of line |
| **gg** | First line of the text |
| **G** | Last line of the text |
| | *Block / range commands* |
| **v** | Start *visual* mode, this marks the block start |
| **y** | Yank the marked block into the paste buffer. |
| **x** | Yank the marked block and delete it from the text. |

| | |
|---|---|
| **P** | Paste the contents of the buffer before the cursor position. te |
| | *File / buffer commands* |
| **:qa!** | Quit, abandon all changes. |
| **:xa** | Exit, save changes. |
| **:e** file-name | Edit a file in a separate buffer. |
| **:bn** | Step through buffers. |
| | *Find / replace commands* |
| / pattern | Goto the next occurrence of 'pattern'. |
| **N** | Repeat the last search. |
| **:%s**/pattern/text/**gc** | Replace each occurrence of 'pattern' in the document with 'text'. Ask for confirmation before executing each replace. |

You normally will use the cursor keys at your keyboard for moving in the text rather than typing the commands shown in the table above. If however the cursor keys do not work for some reason, knowing the command characters may be very helpful.

## 'vi' in the MS Windows telnet client

To make the MS Windows telnet client work well with the *vi* editor, you should configure the telnet client as shown below.




it is important to have the following parameters set:

- No local echo selected.
- The VT100/ANSI emulation chosen.
- The buffer size set to 24 lines.
- VT100 cursor keys enabled.

With these settings you get most comfortable control about the *vi* editor in the telnet window. Text scrolling works as you expect with a buffer size of 24 lines, with the VT100 cursor keys enabled you can move in the text even in INSERT mode.

The keys 'Ins', 'Del', Pos1', 'End', 'Pg Up' and 'Pg Dn' do not work. You should not try to use them as they might insert strange characters in the text instead of doing the function you expect.